

DaimlerChrysler AG

Patent claims

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1. A method for triggering an automatic emergency braking process of a vehicle in order to avoid the vehicle having a rear end collision with a vehicle traveling in front and/or in order to reduce the consequences of a rear end collision, wherein a driver warning is triggered if at least one predefined warning condition is fulfilled, characterized in that the fulfillment of the warning condition specifies that, owing to the instantaneous driving situation of the vehicle, which has come about in view of the registered acceleration (a) of the vehicle and/or the registered relative acceleration (a_{rel}) between the vehicle and vehicle traveling in front, and a predefined emergency braking deceleration (a_{NB}) when a predefined warning time period (t_w) expires, the automatic emergency braking process is to be triggered with the objective of attaining a predefined target relative speed ($v_{rel,z}$) and/or a predefined target safety distance (d_z) between the vehicle and vehicle traveling in front, after the automatic emergency braking process has finished.

2. The method as claimed in claim 1, characterized in that the driver warning takes place in a way which can be perceived visually and/or acoustically and/or haptically by the driver of the vehicle.

3. The method as claimed in claim 2, characterized in that a driver warning which can be perceived haptically by the driver of the vehicle takes place in the form of a partial braking process of the vehicle with a predefined partial braking deceleration (a_{TB}), wherein the predefined partial braking deceleration (a_{TB}) is smaller than the predefined emergency braking

deceleration (a_{NB}).

4. The method as claimed in one of claims 1 to 3,
characterized in that the automatic emergency braking
5 process is triggered only if a given emergency braking
condition is fulfilled and the predefined warning time
period (t_w) has expired.

5. The method as claimed in one of claims 1 to 4,
10 characterized in that the emergency braking
deceleration (a_{NB}) is predefined in a permanent or
adjustable fashion.

6. The method as claimed in one of claims 1 to 5,
15 characterized in that the warning time period (t_w) is
predefined in a permanent or adjustable fashion.

7. The method as claimed in one of claims 1 to 6,
characterized in that the target relative speed ($v_{rel,z}$)
20 is predefined in a permanent or adjustable fashion.

8. The method as claimed in claim 7, characterized in
that the value of a permanently predefined target
relative speed ($v_{rel,z}$) between the vehicle and vehicle
25 traveling in front is approximately zero.

9. The method as claimed in one of claims 1 to 8,
characterized in that the target safety distance (d_z)
is predefined in a permanent or adjustable fashion.

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10. The method as claimed in one of claims 1 to 9,
characterized in that, when the driver is active and/or
when the risk of a rear end collision is reduced, the
driver warning is not triggered.

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11. The method as claimed in one of claims 1 to 10,
characterized in that, when the driver is active and/or
when the risk of a rear end collision is reduced, a

driver warning which has already been triggered is terminated and/or changed and/or the automatic emergency braking process is not triggered.

5 12. The method as claimed in one of claims 1 to 11, characterized in that the automatic emergency braking process is triggered automatically when the predefined warning time period (t_w) expires if the driver warning is not aborted during the predefined warning time
10 period (t_w).

13. The method as claimed in one of claims 1 to 12, characterized in that an automatic emergency braking process which has already been triggered is aborted if
15 a registered emergency braking time period (t_{NB}) and/or the predefined target relative speed ($v_{rel,z}$) and the predefined target safety distance (d_z) are attained.

14. The method as claimed in one of claims 1 to 13,
20 characterized in that the driver warning is composed of at least two warning stages which are triggered in chronological succession within the predefined warning time period (t_w) of the driver warning, wherein each warning stage is assigned a predefined warning stage
25 time period.

15. The method as claimed in claim 14, characterized in that the warning stage time period is predefined in a permanent or adjustable fashion.

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16. The method as claimed in claim 14 or 15, characterized in that, after a first warning stage has been triggered, at least one further warning stage is triggered only if a predefined warning stage condition
35 which is respectively assigned to the further warning stage is fulfilled.

17. The method as claimed in one of claims 14 to 16,

characterized in that, when the driver is active and/or when the risk of a rear end collision is reduced, at least one of the warning stages which has already been triggered is terminated and/or further warning stages
5 are not triggered.

18. The method as claimed in one of claims 1 to 17, characterized in that activity on the part of a driver is detected on the basis of an activation of at least
10 one operator control element which is used, in particular, to change the longitudinal dynamics or lateral dynamics of the vehicle.

19. The method as claimed in one of claims 1 to 18,
15 characterized in that a reduction in the risk of a rear end collision is detected by reference to a distance (d), which increases over time, between the vehicle and vehicle traveling in front and/or a relative speed (v_{rel}), which decreases over time, between the vehicle
20 and vehicle traveling in front.

20. The method as claimed in one of claims 1 to 19, characterized in that the instantaneous driving situation of the vehicle is determined as a function of
25 the registered distance (d) between the vehicle and vehicle traveling in front and/or the registered relative speed (v_{rel}) between the vehicle and vehicle traveling in front and/or the registered speed (v) of the vehicle and/or of the registered relative
30 acceleration (a_{rel}) between the vehicle and vehicle traveling in front and/or the registered acceleration (a) of the vehicle and/or of the inclination of the roadway and/or of coefficients of friction between the roadway and the vehicle's wheels.

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21. The method as claimed in one of claims 1 to 20, characterized in that, when the automatic emergency braking process is triggered, a warning is issued to

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vehicles traveling in front and/or vehicles traveling behind.

22. A device for carrying out an automatic emergency
5 braking process of a vehicle in order to avoid a rear
end collision of the vehicle with a vehicle traveling
in front and/or in order to reduce the consequences of
a rear end collision, having an evaluation unit (7),
wherein, when a warning condition which is stored in
10 the evaluation unit (7) is fulfilled, a driver warning
is triggered by the evaluation unit (7), characterized
in that the fulfillment of the predefined warning
condition, which is stored in the evaluation unit (7),
specifies that, owing to the instantaneous driving
15 situation of the vehicle, which has come about in view
of the registered acceleration (a) of the vehicle
and/or the registered relative acceleration (a_{rel})
between the vehicle and vehicle traveling in front, and
a predefined emergency braking deceleration (a_{NB}) when a
20 predefined warning time period (t_w) expires, an
automatic emergency braking process is to be triggered
by the evaluation unit (7) by suitable actuation of
braking means (38) of the vehicle with the objective of
attaining a predefined target relative speed ($v_{rel,z}$)
25 and/or a predefined target safety distance (d_z) between
the vehicle and vehicle traveling in front, after the
automatic emergency braking process has finished.